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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,921	12/07/2004	Franz-Josef Dietzen	53647	7429

26474 7590 01/05/2009

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EXAMINER	
DANIELS, MATTHEW J	

ART UNIT	PAPER NUMBER
1791	

MAIL DATE	DELIVERY MODE
01/05/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,921	DIETZEN ET AL.	
	Examiner	Art Unit	
	MATTHEW J. DANIELS	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 20-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17 and 20-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/6/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. Rejections set forth previously under this section are withdrawn in view of the amended claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, 7, 9, 15-17 and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875).

Regarding claim 1, BIGLIONE et al. teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene wherein an expanding agent is incorporated with polystyrene polymer in an extrusion die-head with a temperature of about 160 degree Celsius (a process for the preparations of expandable styrene polymers which comprises conveying a blowing agent-containing styrene polymer melt having a temperature in the range from 140 to 300 degree Celsius) [Abstract; claim 1; claim 7; example 1: 33-35]. BIGLIONE additionally suggests that extrusion temperature is a result effective variable which must exceed

the softening temperature [col. 3, lines 28-47]. In the BIGLIONE process, it is submitted that the die plate is heated by the flowing polymer melt to a temperature that is the same as the blowing-agent containing melt. BIGLIONE teaches that the die head comprises several holes having a diameter that may vary between 0.5 and 4 mm [col.3, lines 55-56], and that the extrusion temperature depends on the sizes of the die-head holes [col. 3, lines 36-47]. In example I, BIGLIONE discloses that the die head is provided with 20 holes, wherein each of the holes has a diameter of 0.7 mm (through a die plate with holes whose diameter at the die exit is at most 1.5 mm) [Example I, col.5, lines 32-36]. The polymer melt extruded from the die head was granulated into granules having a diameter about 1.2 mm (and subsequently granulating the extrudate) [Example I, col.5, lines 36-40]. The values of die holes diameter and temperature at which process was carried as taught by BIGLIONE are inclusive of the ranges as required in claim 1.

BIGLIONE et al. is silent to teach about the molecular weight of the expandable polystyrene polymer consisting of 190,000 to 4000 g/mol as required by claim 1.

ZIMMERMANN et al. teaches of polystyrene polymer used in a process for production of expandable styrene polymers wherein the average molecular weight of polystyrene ranges of about 180,000 to about 300,000 g/mol [Abstract; col. 3, lines 8-21].

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the polystyrene polymer with molecular weight of about 180,000 to about 300,000 g/mol as taught by ZIMMERMANN et al. in the process of preparing expandable polystyrene polymers as taught by BIGLIONE et al. in order to produce polystyrene granules from expandable styrene

polymers with high degree of expandability due to the use of low level blowing or foaming agents used to make articles like seat cushions.

Regarding claim 2, the teachings as referenced in claim 1 apply.

Regarding claim 3, modified BIGLIONE in view of ZIMMERMANN teaches of a polydispersity of from about 1.0 to less than 2.5 [ZIMMERMANN, Abstract, col.3: 15-20]. The range is inclusive of the range of at most 3.5 as required.

Regarding claim 4, modified BIGLIONE teaches that the polymer used in the process is polystyrene which reads on the requirements of the claim. It would have been obvious to one of the ordinary skill to use different kinds of styrene containing polymers and copolymers in the process as taught by modified BIGLIONE in order to ensure the production of styrene granules with high expandability used to make articles like seat cushions.

Regarding claim 5, modified BIGLIONE teaches the blowing agent-containing styrene polymer melt comprises between 2 to 10% by weight of one or more blowing agents selected from the group of aliphatic hydrocarbons [col.1: 26-28, col.4: 7-11].

Regarding claim 7, the teachings as referenced in claim 1 apply.

Regarding claim 9, the teachings as referenced in claim 1 apply.

Regarding claim 15, modified BIGLIONE teaches of expanded polystyrene particles produced by polymerizing styrene in aqueous suspension in the presence of blowing agents [ZIMMERMANN: col.2: 7-11]. It would have been obvious to one of ordinary skill in the art to determine and modify the amount of water in the polymer melt in order to the production of styrene granules with high expandability used to make articles like seat cushions.

Regarding claim 16, the teachings as referenced in claim 1 apply. Modified BIGLIONE is silent step b) and that polymer melt was cooled to a temperature of 120 degree Celsius of step d). However, it would have been obvious to one of ordinary skill in the art to degas the resultant styrene polymer melt when polymerized in solution avoid formation of bubbles in the polymer melt in order to ensure formation of styrene granules with high expandability. In addition, it would have been obvious either cool or increase the temperature of the polymer melt once the additives are added so that one can control the temperature of the melt in order to facilitate the extrusion of the melt through the plurality of holes located on the die head or plate and to ensure production of styrene granules with high expandability characteristics.

Regarding claim 17, modified BIGLIONE teaches that cutting or granulation of polystyrene melt was performed in chamber 8 where water circulated at the pressure of 9 Bar (granulation of melt carried out directly behind the die plate under water at pressure in the range from 1 to 10 Bar) [Example I; col.5, lines 40-44].

Regarding claims 20-24, the teachings as referenced in claim 1 and 15 apply. Modified BIGLIONE teaches of expandable styrene polymer (EPS) as required. As per claim 18, it would have been obvious to one of ordinary skill in the art to adjust and modify the quantity of styrene monomer used in the process as taught by modified BIGLIONE to ensure production of styrene granules comprising a quality of high expandability.

Regarding claims 20-21, it would have been obvious to one of ordinary skill in the art to adjust and modify the content of water in the melt in order to produce an expandable styrene polymer with low water content to ensure high expandability of the product. In addition, modified BIGLIONE teaches that spheroidal granules with a diameter of about 1.2 mm (claim

22) [col.5, lines 39-40] with a density of 18g/l are produced (claim 23) [col.5, lines 57-59]. Modified BIGLIONE discloses that colored granules can be produced (claim 24) [col.1, lines 50-54]. It would have been obvious to optimize the amount of pigment used in the process as taught by modified BIGLIONE for aesthetic and appearance purposes as desired by one of ordinary skill in the art yet ensure production of granules comprising a quality of high expandability.

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) as applied to claims 1-5, 7-9,15 -24 above, and further in view of CARMODY et al. (US 3,673,126).

Modified BIGLIONE teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene as referenced in claim 1.

Regarding claim 6, modified BIGLIONE et al. is silent to specifically teach the types of additives comprising plasticizers in proportions in the range from 0.05 to 10% by weight, based on styrene polymer as required.

CARMODY et al. teaches a process for production of expandable thermoplastic polymer compositions wherein a thermoplastic polymer, blowing agent and additive are used to make a melt [Abstract]. CARMODY specifies that additives comprise plasticizers employed in amounts of from 0.02 to 5 % by weight of the polymer [col.4, lines 13-20]. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the teaching composition comprising of plasticizer additives as taught by CARMODY et al. the process as taught by modified BIGLIONE et al. in order to strongly bind, adhere and incorporate the blowing agent

into the polymer melt by using plasticizers to ensure formation of styrene granules comprising a high expandability quality used to make articles like seat cushions.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) as applied to claims 1-5, 7, 9,15 -24 above, and further in view of CUFF (US 3,981,959).

Modified BIGLIONE teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene as referenced in claim 1.

Regarding claim 8, modified BIGLIONE et al. is silent to heating the die plate to the claimed temperature range.

CUFF teaches that in underwater pelletizing processes used with thermoplastic materials, the molten polymer emerges from the extruder at a temperature such as 425 F (218 C), and that the adaptor or die plate (52) is heated by heating oil or other medium to a temperature of 475-500 F (246-260 C) [col. 9, lines 18-20]. Thus, in view of the CUFF process, it is submitted that it is known in the art and conventional to heat the die plate to a temperature which is between 20 and 100 C higher than the temperature of the melt.

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of CUFF into that of BIGLIONE because BIGLIONE suggests that the temperature of the polymer should be adjusted to avoid solidification or obstruction of the polymer in the extrusion holes [col. 3, lines 28-35], and CUFF provides a device and process which the ordinary artisan would have recognized as within the scope of

BIGLIONE's suggestion to adjust the temperature to avoid solidification within the extrusion holes.

5. Claims 10 -14 are rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) as applied to claims 1-5, 7-9,15 -24 above, and further in view of KNAUS et al. (US 5,605,937).

Modified BIGLIONE teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene as referenced in claim 1.

Regarding claims 10 and 12, modified BIGLIONE is silent to teach that the die head or plate has holes having an L/D ratio of at least 2 (claim 10); and that the die plate has holes having a conical inlet with an inlet angle alpha of less than 180 degree (claim 12). Regarding claims 11, 13 and 14, modified BIGLIONE is silent to teach the diameter of the holes at the die entrance of the die plate is at least twice as great as the diameter at the die exit (claim 11); die plate has holes having a conical outlet with an outlet angle beta of less than 90 degree (claim 13); and that the die plate has holes having different exit diameters (claim 14).

KNAUS et al. teaches of a process for making moldable thermoplastic polymer foam beads comprising of a thermoplastic polymer, blowing agents and additives wherein the extruder comprises a die head 24 as shown in Figure 1 [Abstract]. As seen in Figure 1, the die head 24 wherein die entrance within die head 24 is greater than the die exit 30 (claim 11: the die entrance of the die plate is at least twice as great as the diameter at the die exit) [Figure 1]. In addition, in Figure 1, the length of the die zone within the die head 24 seems to be greater than the diameter (D) of the die exit 30 (claim 10). Figures 2 and 3 show die heads having conical outlet with an

angle of less than 90 degree (claims 12 and 13). As seen in Figures 1-4, extrusion devices comprise die heads with different exit holes with different diameters (claim14).

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the teachings of the die head characteristics as disclosed by KNAUS in the process as taught by BIGLIONE et al. in order to produce different marketable size and shape polystyrene granules from expandable styrene polymers with high degree of expandability due to the use of low level blowing or foaming agents used to make a wide range of articles useful in many applications.

Response to Arguments

6. Applicant's arguments filed 6 November 2008 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

a) Applicant has amended Claim 1 to further recite that the die plate is heated to at least the temperature of the blowing agent containing polymer melt and submits that this feature is not disclosed by the references or in the knowledge generally available to the ordinary artisan.

b) The molecular weight of the final product is important, not the molecular weight of the polymer feed material. The molecular weight of the claimed process corresponds to the molecular weight styrene at the heated die plate, Which is typically lower than the raw polymer due to shearing and heating.

c) Biglione teaches heating the blowing agent-containing polymer melt to a higher temperature only when smaller extrusion holes are used.

d) Zimmermann describes a suspension polymerization process to produce expandable polystyrene, and does not describe the use of a polymer melt, a heated die plate, or an extrusion process.

e) There is no reasonable motivation or rationale for one skilled in the art to make the combination. The prior art simply fails to provide sufficient teaching, suggestion, or motivation to combine the various elements.

f) The other references fail to remedy the deficiencies of Bilione and Zimmermann.

7. These arguments are not persuasive for the following reasons:

a) Applicant's arguments do not appear to set forth any reasons why the die plate of Biglione would fail to reach the temperature of the polymer melt passing therethrough. Since a heated, molten polymer would implicitly heat the die plate through which it passes to a temperature at equilibrium with the molten polymer, it is asserted that the Biglione process does provide a die p0late heated to the claimed temperature. Thus, it is asserted that there is no basis for distinguishing the claimed invention from the Biglione process on the basis of the heated die plate.

Additionally, Applicant asserts that knowledge of this feature is generally not available to the ordinary artisan. The Examiner respectfully disagrees and points to the new Cuff reference cited in the rejection of amended Claim 8 to rebut this assertion. Both Biglione and Cuff implicitly recognize that adjustment of temperature is important and that solidification of the material in the die plate is undesirable. Additionally, see Guill (US 3,029,466) for additional evidence that heating of the die plate is conventional in the art. In particular, see the following

portion of the Guill reference at column 3 for the knowledge of the ordinary artisan practicing pelletizing processes:

> Heating the flow of resin through extrusion orifices 23 is important in order to prevent the formation of chunks or balls of resin within orifices 23 caused by the cooling effect of the cold liquid L above the extruding resin. Further, heating of the extruding resin is advantageous since a high temperature differential between the resin and cold liquid L is desired for cutting or shearing the resin at about its congealing point. This feature, namely the function of the heating conduits 24 to heat the extruded resin prior to cutting, makes it possible to employ a relatively calm body of cold liquid within the extrusion and cutting zone of the pelleter for freeing the pellets from the cutting knives and for rapidly solidifying the surface of the formed pellets upon being cut to prevent agglomeration and massing together into useless shapes.

Thus, it is submitted that heating the flow of resin through extrusion orifices is known by those in the art to be important to prevent the formation of chunks or balls of resin within orifices by cooling of the resin. Heating is known in the art to be advantageous, and is not believed to be a distinguishing feature when the claimed invention is considered as a whole.

b) First, it is submitted that there is no evidence which expressly supports Applicant's position regarding the reduction of molecular weight as a result of extrusion in the references. Second, it is submitted that one practicing the process set forth in the rejection of Claim 1 would have used molecular weights of 200,000 to about 300,000 (Zimmermann, col. 5, lines 13-14), and in order for the 300,000 molecular weight polystyrene of Zimmermann to subsequently fall outside of the claimed range upon extrusion, its number average molecular weight would have to decrease by

more than 50%. It is respectfully submitted that a preponderance does not support Applicant's position that such a large molecular weight change would necessarily be present.

c) It is submitted that Biglione teaches temperatures falling within the claimed range, but additionally suggests that both the orifice size and extrusion temperature are optimizable and result-effective variables. It is unclear how the Biglione process is distinguishable from the claimed conditions where Biglione expressly teaches extrusion temperatures up to 200 C used with extrusion holes up to 1 mm (col. 3, lines 44-47).

d) While Zimmermann does appear to describe a polymerization process, it is analogous at least with respect to Zimmermann's production of polystyrene specifically suggested for expandability (Zimmermann, title). In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The elements asserted to be lacking from Zimmermann (polymer melt, heated die plate, extrusion process) are found in the Biglione reference.

e) In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Biglione appears to be silent to the particular molecular weight feedstock used in

that process. But this does not mean that any molecular weight feedstock is nonobvious. Instead, it is submitted that Biglione thereby suggests that a feedstock having a molecular weight suitable for expandability should be used. Clearly the material disclosed by Zimmermann fulfills the intended use contemplated by Biglione, and therefore would have been an obvious molecular weight material for that of Biglione, or a substitutable alternative.

f) Since the other references teach pertinent aspects of the invention and have not been particularly argued, these rejections are maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew J. Daniels/
Primary Examiner, Art Unit 1791
1/3/09